# Health Consultation

PHILLIPSBURG COMMUNITY PARK

VILLAGE OF PHILLIPSBURG, MONTGOMERY COUNTY, OHIO

JULY 29, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

## Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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# HEALTH CONSULTATION

# PHILLIPSBURG COMMUNITY PARK

# VILLAGE OF PHILLIPSBURG, MONTGOMERY COUNTY, OHIO

Prepared By:
Ohio Department of Health
Under Cooperative Agreement with the
The U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

June 18, 2008

Steven Renninger
U.S. Environmental Protection Agency
Emergency Response Section
26 West Martin Luther King Drive (G41)
Cincinnati, OH 45268

Dear Mr. Renninger:

This letter is in response to your request to evaluate the potential lead exposures at the Phillipsburg Community Park in the Montgomery County area. The Health Assessment Section (HAS) of the Ohio Department of Health was asked to review and evaluate the results of Ohio EPA sampling of surface soils at the park for lead contamination and give a recommendation regarding a removal action.

**Background and Statement of Issues**

The park consists of three baseball fields, tennis courts, picnic shelters, and a playground. It had been previously used as a trap shooting range from 1925 to 1988. The shooting stations, where lead shoot was used until the 1960's, are still present but no longer in use. Soil sampling at the park conducted by the Ohio EPA indicated that lead contamination was above U.S. EPA removal guidelines (400 ppm) in the areas around the current ball diamonds, including parts of the infield of one baseball diamond and the outfield of another diamond (Figure 1). Ohio EPA had requested U.S. EPA assistance in conducting a potential Time-critical Removal Action at the park in a letter dated May 21, 2008.

**Exposure Evaluation Summary**

The Ohio EPA had taken 140 soil samples and analyzed them by XRF (X-ray Fluorescence). The recommended 400 ppm lead screening level was exceeded in 36 (26 %) of the 140 surface soil samples collected at a depth of 0 to 6 inches below ground surface. The elevated lead detections were primarily found between the middle and eastern ball diamonds, where the average lead level in this area (shot drop zone) was 1,600 ppm and the highest level found was 5,979 ppm. Soil sampling results also indicated that lead contamination had reached the farthest baseball diamond. There appears to be a completed exposure pathway for people who use the contaminated portion of the park to come into contact with the lead in the soils. HAS responded to concerns expressed by the village facilities manager regarding limiting access to the site. Per HAS advice, the middle diamond with the contaminated bare soils in the infield has been removed from further play and may be fenced off temporarily, pending the removal action. Activities in the larger diamond that had detects in the outfield were allowed to continue as this area is currently grassed over and direct contact with the lead in the soil is not expected. Neither

area is expected to pose an acute health threat to individuals incidentally using the facilities at the park. Potential exposures would more likely come from airborne dust and contaminated bare soil over time.

**Health Evaluation Summary**

Children (especially infants and toddlers) are the primary concern when it comes to exposure to lead because their bodies tend to absorb more lead than adults. While adults will absorb only a few percent of the lead that they may swallow, children absorb about 50% of ingested lead. Children are also more sensitive to the effects of lead exposure than are adults. Even at low levels, lead can affect a child's mental and physical development, in part because their brains and nervous systems are still developing. The effects of lead are the same whether it enters the body through breathing or swallowing. The major adverse health effect from exposures to excessive amounts of lead is damage to the nervous system potentially resulting in lower intelligence and behavioral effects that persist into adulthood (ATSDR, 2007).

The main exposure routes with regard to lead poisoning are by ingestion (eating or drinking) or inhalation (breathing it in). The major pathway of concern, especially with regard to infants and toddlers, is by incidental ingestion of lead-contaminated soil/dusts resulting from repeated hand-to-hand mouth activity. Small children and infants are closer to and spend more time on the ground where they may come into contact with lead-contaminated soil and dust.

**Conclusions**

1. Bare, lead-contaminated soils at the Phillipsburg Community Park pose a ***Public Health Hazard*** to park visitors, especially children, *in the present*. Potential exposure pathways at the present include incidental contact with lead-contaminated soils due to marginal grass cover around the middle ball diamond. Children playing or digging into soils in the impacted areas may come into incidental contact with the lead in the soil.

2. Lead-contaminated soils posed an ***Indeterminate Public Health Hazard*** to visitors *in the past.*

3. The continued presence of elevated lead in surface and shallow subsurface soils may pose a ***Potential Health Hazard*** to park visitors *in the future* if the grass cover is removed and lead-contaminated soils are exposed at the surface.

**Recommendations**

1. The full extent of the lead contamination of soils at the Phillipsburg Community Park site should be determined.

2. The occurrence of exposed, bare soils in areas determined to have elevated levels of lead in surface soils (> 400 ppm) should be minimized to prevent incidental exposure to the lead in these soils. Children should avoid contact with exposed soil in the areas with surface soils with lead concentrations > 400 ppm.

3. Park visitors should use proper hygiene techniques to reduce their chance of exposure to lead-contaminated soils or dust. Visitors should practice frequent hand-washing following park activities that might bring contact with exposed soils.

4. Future exposures to lead-contaminated soils can be eliminated by removing soils with lead levels in excess of the 400 ppm.

Sincerely,

Robert C. Frey, Ph.D.
Chief, Health Assessment Section
Ohio Department of Health

RF/jk

## CERTIFICATION

This Lead Contamination Health Consultation was prepared by the Ohio Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun. Editorial review was completed by the Cooperative Agreement Partner.

Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Team Lead, Cooperative Agreement Team, CAPEB, DHAC, ATSDR

**Figure 1. Soil Sampling Results > 400 ppm at Phillipsburg Community Park**

Source: Ohio EPA May 2008

● Total Lead >400 ppm

N

## Appendix A: Toxicological Evaluation

*Discussion*

Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust. However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds. Once lead falls onto soil, it sticks strongly to soil particles and remains in the upper layer of soil. Some lead compounds are changed into other forms of lead by sunlight, air, and water; however, elemental lead cannot be broken down. The lead in the Phillipsburg Community Park was due to the use of lead shot when the park was used as a shooting range from about 1925 until 1988, where it remained in the soil.

Lead contaminated soil can pose a risk through direct ingestion, uptake in vegetable gardens, or tracking into homes. Uncontaminated soil contains lead concentrations less than 50 ppm but soil lead levels in many urban areas exceed 200 ppm. The EPA's standard for lead in bare soil in play areas is 400 ppm by weight and 1200 ppm for non-play areas. This regulation applies to cleanup projects using federal funds (ATSDR CSEM 2007).

Lead exposure in the general population (including children) occurs primarily through ingestion, although inhalation also contributes to lead body burden and may be the major contributor for workers in lead-related occupations. Because of their behavior and physiology, children are more affected by exposure to lead than are adults. Children absorb more ingested lead than do adults. Children generally ingest lead-contaminated soil and house dust at higher rates than adults because of mouthing and hand-to-mouth behaviors. Children who exhibit pica, a compulsive hand-to-mouth behavior and repeated eating of nonfood items, are at greatest risk. Children have a higher breathing rate than adults, breathing in a greater volume of air per pound. Being shorter than adults are, children are more likely to breathe lead-contaminated dust and soil as well as fumes close to the ground. In addition, the percent of lead absorbed in the gut, especially in an empty stomach, is estimated to be as much as five to 10 times greater in infants and young children than in adults. (ATSDR CSEM 2007).

*Acute effects*

An acute high exposure to lead can lead to high short-term blood lead levels (BLLs) and cause symptoms of lead poisoning. In children, acute exposure to very high levels of lead may produce encephalopathy and other accompanying signs of coma, convulsions, death, hyperirritability, lack of coordination and stupor. The BLLs associated with encephalopathy in children vary from study to study, but BLLs of 70-80 μg/dL or greater appear to indicate a serious risk. Even without encephalopathy symptoms, these levels are associated with increased incidences of lasting neurological and behavioral damage (ATSDR CSEM 2007).

*Chronic effects (Noncancer)*

Children are more sensitive to the effects of lead exposure than are adults. Neurological effects in children may begin at low BLLs, at or below 10 micrograms per deciliter (μg/dL) in some cases. Studies have found a measured decrease in IQ as blood lead levels increase. There is also evidence that attention deficit hyperactivity disorder (ADHD) and hearing impairment in

children increase with increasing BLLs, and that lead exposure may disrupt balance and impair peripheral nerve function (ATSDR 2007).

CDC considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 micrograms per deciliter (µg/dL). Ohio considers children with blood lead levels equal to or greater than 10 µg/dL as lead-poisoned [OAC 3701-30-01 (N)]. EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter (µg/m3) averaged over 3 months.

The Agency for Toxic Substances and Disease Registry (ATSDR) has not derived Minimal Risk Levels (MRLs) for lead, and the EPA has not developed a Reference Dose (RfD) for chronic oral exposure for lead. The EPA has decided that it would be inappropriate to develop a reference dose for inorganic lead (and lead compounds) because some of the health effects associated with exposure to lead occur at blood lead levels as low as to be essentially without a threshold (IRIS 2004).

The EPA's standard for lead in bare soil in play areas is 400 ppm by weight and 1200 ppm for non-play areas. This regulation applies to cleanup projects using federal funds (ATSDR CSEM 2007). Soil samples collected by the Ohio EPA at the Phillipsburg Community Park indicated an area around the middle and eastern ball diamonds that was above this 400 ppm level.

*Cancer risk*

The International Agency for Research on Cancer (IARC) classifies inorganic lead compounds as *probably carcinogenic to humans (Group 2A)*, based on limited evidence of carcinogenicity in humans and sufficient evidence in animals. In the 11$^{th}$ Report on Carcinogens, the National Toxicology Program (NTP) of the U.S. Department of Health and Human Services concluded that "lead and lead compounds are *reasonably anticipated to be human carcinogens*" (NTP 2005). In arriving at its conclusions, the NTP relied upon studies on laboratory animals and workers exposed to high levels of lead. The laboratory animals developed brain, kidney, and lung cancer. The workers inhaled high levels of lead fumes or accidentally ingested lead dust. The worker studies did not account for diet, smoking, and exposure to other cancer-causing agents. The worker study showed weak evidence for increased risk for lung, stomach, or bladder cancer. The workers were exposed to lead at 50 to 5,000 micrograms per cubic meter (µg/m$^3$) in air and had 40 to 100 µg/dL in blood. These above exposures greatly exceed the expected types of exposures that could potentially occur with regard to use of the park by nearby residents.

**References**

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR). 2007. Toxicological Profile for Lead (Update). U.S. Department of Health & Human Services. 2007. 528 p + appendices.

ATSDR. 2007. Case Studies in Environmental Medicine (CSEM) – Lead Toxicity. Course: WB 1105. U.S. Department of Health & Human Services. 71 p. August 2007.

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC). 2006. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 87. Inorganic and Organic Lead Compounds. Summary of Data Reported and Evaluation

NATIONAL TOXICOLOGY PROGRAM (NTP). 2005. Report on Carcinogens, 11th Edition. Lead and Lead Compounds. NTP. U. S. Department of Health and Human Services. January 31, 2005.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (U.S. EPA). 1994. Office of Solid Waste and Emergency Response Directive #9355.4-12. Revised Interim Soil Lead Guidance for CERCLA sites and RCRA Corrective Actions Facilities. August 1994.

U.S. EPA. 2004. Integrated Risk Information System (IRIS). Lead and compounds (inorganic); CASRN 7439-92-1. Last Revised: September 2004.

## Appendix B: Fact Sheet

Bureau of Environmental Health
Health Assessment Section

"To protect and improve the health of all Ohioans"

# Lead

## Answers to Frequently Asked Health Questions

## What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts of the earth's crust. Prior to our current knowledge of the health hazards of lead, it was widely found in many of the products we used every day. Products such as gasoline, paints, batteries, metal products and ammunition just to name a few. Because lead is toxic, its use has been dramatically reduced since the 1980's.

## Lead in the environment:

Lead does not break down in the environment. And although lead occurs naturally in the environment, most of the high levels of lead found come from human activities.

Once lead falls on to soil, it usually sticks to the soil particles. If the soil is uncovered and open to the air or becomes disturbed, lead-contaminated dust is created and carried by the wind. This dust is easily breathed in or swallowed. With construction activities, the possibility of lead-contaminated dust is an important concern.

Gardens grown in lead-contaminated soils may contain lead. Produce of fruits, grains and vegetables (especially root vegetables such as beets, carrots, parsnips, radishes, turnips, and rutabagas) absorb some of the lead through their roots. There is also the possibility of lead-contaminated dust falling onto crops.

Inside the house, lead can be found in lead-based paint, lead-contaminated dust, older lead pipes that carry water and some glazed pottery. A child can easily eat lead paint chips, breathe or ingest the dust on their fingers.

## How does lead get in your body?

You may be exposed to lead by breathing (inhalation), eating/drinking (ingestion) or by skin contact (dermal contact). However, only very small amounts of lead can get into your body through dermal contact. Inhalation and ingestion of lead-contaminated dust and soil are the main health concerns.

## How does lead affect your health?

The harmful effects of lead are the same whether it is breathed or swallowed. The main target for lead toxicity is the nervous system, including the brain. But lead can negatively affect every organ of the body.

Children are most vulnerable to lead poisoning because they play outside, close to the ground or in the dirt. Small children also put their fingers in their mouths. Compared to adults, a bigger proportion of the amount of lead swallowed will enter the blood in children. About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of weeks. But only about 32% of the lead taken into the body of a child will leave in the waste.

Lead exposure in the womb, in infancy, or in early childhood may also slow mental development and lower intelligence later in childhood. Lead can cause irritability and aggressive behavior in children. If pregnant women have high levels of lead in their bodies, fetuses exposed to lead in the womb may be born prematurely and have lower weights at birth. In some cases, pregnant women with high levels of exposure to lead may have miscarriages.

Some other harmful health effects of lead include damaged kidneys, damaged male reproductive system, severe "stomachaches," a poor appetite, sleep disorders, and hearing problems. Lead can also decrease reaction time and affect the memory.

## Is there a medical test to determine whether I have been exposed to lead?

Yes, there is a test to see if you have been exposed to lead. The primary screening method is the measurement of total lead in the blood. This test can tell if you have been recently exposed to lead.

Also, exposure to lead can be evaluated by measuring the erythrocyte protoporphyrin (EP) in the blood sample. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL). For this reason, total lead is the primary method of screening.

Lead can also be measured lead in teeth or bones by X-ray techniques. These tests can tell about long-term exposure but are not widely available..

## How can families reduce the risk of exposure to lead?

The most important way a family can lower exposures to lead is to avoid exposure to lead-contaminated soil and dust sources, avoid lead-based paint chips, avoid water from lead-lined pipes and avoid some plastic products made outside the United States.

The swallowing of lead-contaminated soil or dust is a very important exposure pathway for children. This problem can be reduced in many ways. Regular hand and face washing to remove lead dust and soil, especially before meals, can lower the possibility that lead on the skin is accidentally swallowed while eating. Families can lower exposures to lead by regularly cleaning the home of dust and tracked-in soil. Door mats can help lower the amount of soil that is tracked into the home and removing your shoes before you enter the house will also help. Planting grass and shrubs over bare soil areas in the yard can lower contact that children and pets may have with soil and the tracking of soil into the home. Also, wash all produce grown in lead-contaminated soils before eating.

Families whose members are exposed to lead-contaminated soil and dust can minimize the exposure to children by changing and bagging their work clothes before they are brought into the home for cleaning. Also, they should immediately wash their hands or shower.

It is important that children have proper nutrition and eat a balanced diet of foods that supply adequate amounts of vitamins and minerals, especially a diet high in calcium and iron. Good nutrition lowers the amount of swallowed lead that passes to the bloodstream and also may lower some of the toxic effects of lead.

**The Ohio Department of Health has a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), Public Health Service, U.S. Department of Health and Human Services.**

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## Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 µg/dL. Medical evaluation and environmental investigation and remediation should be done for all children with blood lead levels equal to or greater than 20 µg/dL. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 µg/dL.

The Environmental Protection Agency (EPA) requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter (µg/m$^3$) averaged over 3 months. EPA regulations no longer allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

The EPA regulations also limit lead in drinking water to 0.015 milligrams per liter (mg/L). The 1988 Lead Contamination Control Act requires the Consumer Product Safety Commission (CPSC), EPA, and the states to recall or repair water coolers containing lead. This law also requires new coolers to be lead-free. In addition, drinking water in schools must be tested for lead, and the sources of lead in this water must be removed.

To help protect small children, CPSC requires that the concentration of lead in most paints available through normal consumer channels be not more than 0.06%. The Federal Hazardous Substance Act (FHSA) bans children's products containing hazardous amounts of lead.

The EPA has also developed standards for lead paint hazards, lead in dust, and lead in soil. To educate parents, homeowners, and tenants about lead hazards, lead poisoning prevention in the home, and the lead abatement process, EPA has published several general information pamphlets. Copies of these pamphlets can be obtained from the National Lead Information Center or from various Internet sites, including http://www.epa.gov/opptintr/lead.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 1997. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

### Where can I get more information?

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